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# Journal of the Society of Arts.

FRIDAY, AUGUST 14, 1868.

## Announcements by the Council.

### PRIZES.

The Council, at the suggestion of the Food Committee, offer the following prizes for Improved Railway Meat Vans, Milk Vans, and Milk Cans:—

1. For an improved method of conveying meat by rail, the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which meat now suffers in its transit by rail. The principal evils to be avoided are—excessive changes of temperature, and injuries by pressure, by handling, exposure to dust, insects, &c. This prize may be awarded for an improved railway meat van or for a travelling meat larder suitable for railways.

Model on a scale of half an inch to a foot to be sent in.

2. For an improved method of conveying milk cans by rail; the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which milk now suffers in its transit by rail in the ordinary open trucks. The principal evils to be avoided are—the heating and shaking of the milk cans.

Model of an improved railway milk van, on a scale of half an inch to the foot, to be sent in.

3. For an improved railway milk can, the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which milk now suffers in its transit by rail in the ordinary milk cans, or “churns.” The principal evils to be avoided are—the heating of the milk, and all motion within the can which may cause the buttery particles to separate.

A specimen of the improved railway milk-can to be sent in.

The models and specimens for competition must be forwarded to the Secretary of the Society of Arts before the 1st February, 1869.

### HARVESTING CORN IN WET WEATHER.

The Essay by Mr. W. A. Gibbs, of Gillwell-park, Sewardstone, Essex, for which the Gold Medal of the Society and a prize of Fifty Guineas were awarded, is now ready. Published by Messrs. Bell and Daldy, York-street, Covent-garden, publishers to the Society of Arts; price one shilling, illustrated by woodcuts.

### SUBSCRIPTIONS.

The Midsummer subscriptions are due, and should be forwarded by cheque or Post-office order, crossed “*Coutts and Co.,*” and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

## PROGRAMME OF EXAMINATIONS FOR 1869.

### PRELIMINARY NOTICE.

I. The Examinations described herein have been established for the benefit of the members and students of Institutions in Union with the Society of Arts. Such persons are commonly mechanics, artisans, soldiers,\* labourers, clerks, tradesmen and farmers in a small way of business, apprentices, sons and daughters of tradesmen and farmers, assistants in shops, and others, of various occupations, who are not graduates, undergraduates, nor students of a University, nor following nor intending to follow a learned profession, nor enjoying nor having enjoyed a liberal education. To all such members and students in the Institutions, and to other persons of the like condition, male and female, the Examinations, certificates, and prizes, described in this programme, are open on the general conditions stated herein. Persons, however, who are, or have been, professional teachers or pupil teachers; persons who either are enjoying or have enjoyed a liberal education, or who occupy a higher position in society than those above described, may obtain certificates, but cannot compete for the prizes, of which particulars are given on pages 683 and 684.

II. The certificates are not competed for. They are awarded as records of positive, not comparative, attainment. The prizes are competed for.

\* The following circular memorandum (Gen. No. 331), addressed to the army at home, has been issued:—“Miscellaneous 1 (1865).—The Field-Marshal Commanding-in-Chief, desires it to be notified that there will be no objection to soldiers, their wives, and families, being permitted to present themselves for instruction and examination at the Educational Institutes in connection with the Society of Arts, on the understanding that they are not on that account to be exempt from any military duty, nor, except in special cases, to be out of barracks after watch-setting or tattoo.—By command of his Royal Highness the Field-Marshal Commanding-in-Chief, JAMES YORKE SCARLETT, Adj. Gen.—Horse Guards, S.W., 11th March, 1866.

III. For the conditions on which persons of a higher grade in society may be examined and receive certificates, but not compete for prizes, see paragraph 4 (D).

IV. The Candidates for Examination have not to go to a distance from their homes. The Examinations are held in all places in the United Kingdom where a Local Educational Board connected with the Society of Arts is willing to make the requisite arrangements.

V. For a list of the Local Boards already formed, see page 685.

VI. For instructions as to the formation of Local Boards and their duties, see page 676.

### The EXAMINATIONS are—

- (1.) The Previous Examination by District Unions and Local Boards for ascertaining the fitness of Candidates to present themselves at the final Examination.
- (2.) The Final Examination by the Society of Arts' Board of Examiners, under the supervision of the Local Boards.

### PREVIOUS EXAMINATIONS BY DISTRICT UNIONS AND LOCAL BOARDS.

1. The object of these examinations is to “sift” the Candidates for the Final Examinations, so as to keep back (1) those who are not fairly grounded in the elements of education—spelling, writing, and arithmetic—and (2) those who are not fairly acquainted with the subject or subjects in which they desire to be examined by the Society of Arts, and are therefore unlikely to succeed in that Examination. The sifting in the above-named elementary subjects may be effected at the discretion of

the Local Boards; they should examine their Candidates in spelling and writing by dictating to them a passage from an English author for them to write down; in arithmetic by setting them moderately easy questions to work out in the usual manner. The best mode of sifting the Candidates in the special subjects in which they desire to be examined by the Society of Arts is for the Local Boards to examine them therein by means of printed (or written) questions and written answers; but, where a Local Board finds itself without the means of conveniently holding such an Examination in any special subject, such Board may satisfy itself in any other mode, and state simply that it has satisfied itself, that the Candidate is fit to be examined by the Central Board in that subject.

2. The Previous Examinations must be held sufficiently early in the year to enable the proper returns to be made, as explained in par. 6.

#### FINAL EXAMINATION BY THE SOCIETY OF ARTS.

3. No candidate can be admitted to the Final Examination unless duly returned by a District Union or Local Board as having passed a Previous Examination.

4. Every admitted Candidate must be at least 16 years of age.

(A.) Members of, or students of classes in, Institutions in Union with the Society of Arts, are examined . . . . . Free.

(B.) Members of, or students of classes in, Small Institutions,\* not in Union with the Society of Arts, but subscribing one guinea a year for admission to the Examinations alone, are examined . . . . . Free.

(C.) Members of, or students of classes in, "Small Institutions"\* not in Union with the Society of Arts, but connected with it through a District Union or Local Board, are examined on payment of a fee of . . . . . 2s. 6d.

N.B.—It will be understood that Candidates coming under the heads (A), (B), or (C) must not be of a higher class in society than those described in par. I. of the Preliminary Notice.

(D.) Persons of a higher class of society than those described in paragraph I. (Preliminary Notice), cannot compete for prizes, but may be examined for certificates on payment of a fee of . . . . . 5s.

5. The Council in every case require the Local Boards to certify whether a Candidate should pay this higher fee; and it is earnestly hoped that in any instance where a Local Board has reason to believe that a Candidate is or has been a teacher, or that he or his parents occupy such a position in society, or are in such easy pecuniary circumstances as to disqualify him, according to the regulations, for competing for a prize, they will at once, in case of certainty, return him as not competing for a prize, or in case of doubt, communicate with the Secretary of the Society of Arts.

6. A copy of Form No. 2 will be forwarded to the Secretary of each Local Board, and must be filled up and returned to the Secretary of the Society of Arts before the 18th of March. The requisite number of forms No. 4 will then be forwarded, and these, when filled up, must be returned not later than the 3rd of April. Each of these forms, when returned, will be numbered at the office of the Society of Arts, and a card for each candidate, with his name and his number, will afterwards be forwarded to the Secretary of the Local Board for distribution, together with copies of the time-table.

7. The printed papers of questions in the various subjects will be afterwards forwarded to the Secretary of the Local Board; details as to the mode in which the Final

Examination is to be conducted are contained in the Letter of Instructions (Form No. 6), and members of the Local Boards should make themselves thoroughly acquainted with them.

8. When the Candidates' papers have been submitted to the judgment of the Society's Examiners, certificates of three grades will be awarded, and the names of the Candidates who obtain prizes and certificates will be afterwards published in the *Journal of the Society of Arts*.

9. A Candidate who has obtained from the Society a certificate of the 1st class in any subject cannot again be examined in the same subject; but a Candidate who has obtained a certificate of the 2nd or 3rd class may, on the recommendation of the Local Board, be examined in the same subject, in a subsequent year, without again passing the Previous Examination.

10. A Candidate who, having obtained a certificate in any subject, desires to be examined in some other subject, in a subsequent year, may be "passed" by the Local Board, after an examination in that subject, without re-examination in the elementary subjects; but, in all cases, the name must be returned in the proper form.

11. Particulars of the subjects for the Final Examination are given below.

12. The Time-table has been drawn up to meet the general convenience of the Candidates; and *no variation* of it can *possibly* be allowed, so that, in choosing the subjects in which they desire to be examined, Candidates must take notice of the arrangements of this Time-table, as they *cannot* be examined in *two* subjects which are set down for the same evening. The days and hours of Examination must be *strictly* adhered to.

13. The Examiners will reject all ill-written, ill-spelt, ill-composed, or ungrammatical papers that may be laid before them.

TIME-TABLE FOR 1869.

TUESDAY, 27th April, From 7 to 10 p.m.	WEDNESDAY, 28th April, From 7 to 10 p.m.	THURSDAY, 29th April, From 7 to 10 p.m.	FRIDAY, 30th April, From 7 to 10 p.m.
Arithmetic. Trigonometry. Magnetism and Electricity. Light and Heat. Mining and Me- tallurgy. Practical Geo- metry. German. Floriculture. Musical Compo- sition. (Tonic Sol-fa.)	Book-keeping. Navigation. Conic Sections. Chemistry. Theory of Music. Domestic Eco- nomy. English History. Italian. Civil Govern- ment. Fruit and Vege- table Culture. Freehand Draw- ing.	Metrical System. Mensuration. Algebra. Practical Me- chanics. Political Eco- nomy. French. †English Litera- ture. Fruit and Vege- table Culture. Freehand Draw- ing.	Geometry. Principles of Mechanics. Botany. Geography. Latin. Logic & Men- tal Science. Spanish. Animal Phy- siology. Mechanical Drawing.

† Two papers of one hour and a half each in this subject are considered as one.

#### LOCAL EDUCATIONAL BOARDS.

14. Local Boards may be formed wherever the managers of Institutions, or other persons, may be prepared to co-operate with the Society of Arts.

15. Each Local Board must consist of at least three members, and must have a Chairman and a Secretary. The district for which the Board is to act should be defined, and the composition of the Board must be such as to command the respect and confidence of the neighbourhood. No member or officer of a Local Board can be admitted to examination.

16. The duties of Local Boards may be defined as follows:—

(A.) To give publicity to the system of Examinations by the circulation of the programmes, hand-bills, &c. (copies of these will be furnished *gratis* on application), and to give encouragement and advice to those young persons who are likely to become candidates.

(B.) To hold the Previous Examinations.

(C.) To superintend the Final Examinations.

\* Small Institutions are defined as those which have an income of less than £75 a year.

17. Local Boards make no payment to the Society, unless they exercise the power of admitting candidates who are not members of any Institution in Union with the Society of Arts (see par. 4 C.); in which case a subscription of one guinea a year must be paid.

18. A detailed list of each Local Board (giving the exact address of the Secretary) must be submitted to the Council of the Society of Arts before the 1st of February, 1869, when the general list of such Boards will be published; and where a Local Board comprises so large a district that, for the convenience of the candidates, Branch Local Boards have to be formed, lists of these must also be given. All changes in the composition of the Boards must be notified to the Society of Arts.

19. N.B.—Local Boards may also usefully direct their attention to the holding of Preparatory Examinations in Elementary Subjects, either upon the system described at page 687, or upon any other system that they may prefer.

#### SUBJECTS FOR THE FINAL EXAMINATION IN 1869.

\*\*\* In consequence of less than six Candidates having been Examined at the last Examination in the following subjects:—Conic Sections, Navigation and Nautical Astronomy, Mining and Metallurgy, and Italian, the Council have determined that no Examination can be held in any of these subjects in 1869, unless they receive intimation, before the 1st February, that at least six Candidates are preparing to present themselves for Examination in such subjects.

20. In the following paragraphs will be found brief outlines of the subjects in which candidates may be examined, and their attention is especially drawn to this part of the Programme. In many instances the Examiner has set down certain Text-books; but, in most cases, a candidate may exercise his own judgment as to what Text-book he uses; real knowledge, however or wherever acquired, will be accepted by the Examiners. In the following subjects, however, Political Economy, Civil Government, English History, English Literature, Logic, Latin and Roman History, French, German, Italian and Spanish, the course of study is necessarily prescribed with more or less exactness.

#### I.—ARITHMETIC.

Examiner.—Rev. Alexander Wilson, M.A., National Society, London.

21. Practice—Simple and Compound Proportion—Interest—Discount—Insurance—Vulgar and Decimal Fractions; with the principles of a Decimal Notation in money on the basis of a pound unit.

22. The questions framed from the preceding syllabus will consist mainly of practical problems, and the Examiner will take into account not only the correctness of the answers, but also the excellence of the methods by which they are worked out, and the clearness and neatness of the working, which must always be shown.

23. Text Books:—Any of the modern treatises on Arithmetic, such as Hunter's Text Book (*National Society*), Colenso (*Longmans*), or Barnard Smith (*Macmillan*).

#### II.—PRINCIPLES AND PRACTICE OF THE METRIC SYSTEM.

Examiner.—W. Fletcher Barrett, Esq., Lecturer on Physical Science at the International College.

24. Candidates will be required to have some knowledge of the history and philosophy of the Metric System; why the metre was selected as the basis; the places and possessions where this system is already in use; reasons for the general adoption of the Metric System. They will have to be acquainted with the manner in which the units of weight, capacity, and surface are derived from the metre; and should be able readily to convert the multiples and divisions of the fundamental units into English equivalents. Problems will be given

on the application of the Metric System to the calculation of the volumes and weights of liquid or solid masses, the dimensions and specific gravity of which are stated; and also on the determination of the relative and absolute weight of any gas in any given vessel.

25. Candidates may obtain special information on this subject by reading chapter 8 in Dr. Hofmann's "Modern Chemistry" (*Walton and Maberly*), or consulting the publications of the International Decimal Association.

#### III.—BOOK-KEEPING BY DOUBLE ENTRY.

Examiners.—John Ball, Esq., of the firm of Messrs. Quilter and Ball, and Robert G. C. Hamilton, Esq., Principal Accountant to the Committee of Council on Education.

26. Candidates should be prepared to answer questions as to the nature and use of the different books usually kept in a merchant's office; to journalise a series of transactions from a waste book, and having posted the entries to the ledger, to balance the accounts, to prove the correctness of the postings by a trial balance, and finally to exhibit an account of profit and loss, and a balance sheet.

27. Text Books:—Rudimentary Book-keeping (*Weale's Series*). Kelly's Elements of Book-keeping (*Simpkins and Co.*). Examination-Questions in Book-keeping by Double Entry, by the Rev. J. Hunter, M.A. (*Longmans*).

#### IV.—ALGEBRA.

Examiner.—Rev. T. P. Hudson, M.A., Fellow and Tutor of Trinity College, Cambridge.

28. Elementary Operations and Fractions. Simple and Quadratic Equations and Problems leading to them. Involution and Evolution. Surds. Arithmetical, Geometrical, and Harmonic Series. Combinations and Permutations. Binomial Theorem. Scales of Notation. Interest and Annuities. Elementary Theory of Probabilities.

29. Text Books:—Todhunter's Algebra (*Macmillan*), Colenso's Algebra (*Longmans*), Lund's or any other modern treatise on Algebra.

30. The Examiner, referring to last year's papers, says:—"It would in my opinion be advisable that the candidates in future examinations should be cautioned against sending up mere results without giving the working by which they are obtained."

#### V.—GEOMETRY.

Examiner.—Rev. B. Morgan Cowie, M.A., Professor of Geometry at Gresham College; one of H.M. Inspectors of Schools.

31. To obtain a first-class certificate, at least six problems and four propositions must be correctly done; to obtain a second-class, at least four problems and six propositions.

32. Text Books:—Euclid, Books I., II., III., IV., VI., XI., as far as Prop. 21. Potts' smaller edition (*Parker*). Green's Euclid's Plane Geometry, practically applied, is a useful help to those who are studying by themselves (*Heywood, Manchester; Simpkin, Marshall, and Co., London*).

#### VI.—MENSURATION.

Examiner.—John Sykes, M.A., Assistant-Secretary to the Committee of Council on Education.

33. The calculation of the areas and circumferences of plane figures bounded by arcs of circles or right lines, and solid contents of cones, cylinders, spheres, &c. Candidates will be expected to be familiar with the different rules for measuring and estimating artificers' work, such as joiners', bricklayers', masons', and plumbers' work, and to be able to prepare estimates of such work from given quantities.

34. Text Books:—Lund's Mensuration, Part III. of his Elements of Geometry and Mensuration. Tate's Mensuration. Young's Treatise on Mensuration (*Sims and M'Intyre*).

35. The Examiner, in speaking of last year's work, says:—"The paper has been very well done by most of

the candidates, if we except the questions on the mensuration of solids. Very few have shown themselves to be 'familiar with the different rules for measuring and estimating artificers' work.'"

#### VII.—TRIGONOMETRY.

*Examiner.*—Rev. T. G. Hall, M.A., Professor of Mathematics in King's College, London.

36. In Plane Trigonometry, the formulas for the trigonometrical functions of angles, the numerical solution of plane triangles, the use of logarithmic tables, and angular and exponential series.

37. Text Books:—Snowball's or Todhunter's Trigonometry, Trigonometry for Schools (*Christian Knowledge Society*), or any other of the modern treatises on Trigonometry. Mathematical Tables (Chambers' Series).

#### VIII.—CONIC SECTIONS.

*Examiner.*—Rev. Bartholomew Price, M.A., F.R.S., Sedleian Professor of Natural Philosophy in the University of Oxford.

38. The properties of the three curves treated geometrically; also as deduced from the cone. The principles of projection, orthogonal and central, applied to derive the properties of the conic sections from those of the circle.

39. Analytical conics, including the equations of the straight line, the circle, the three conic sections, and the general equation of the second degree.

40. Text Books:—Drew's Conic Sections (*Macmillan*). Taylor's Conic Sections (*Macmillan*). Salmon's Conic Sections (*Longmans*). Todhunter's Conic Sections (*Macmillan*). Puckle's Conic Sections (*Macmillan*).

\*.\* Candidates intending to be examined in this subject should request the Secretary of their Local Board to communicate such intention to the Secretary of the Society of Arts, before the 1st February. (See notice at page 677).

#### IX.—NAVIGATION AND NAUTICAL ASTRONOMY.

*Examiner.*—Rev. Joseph Woolley, LL.D., Director of Education for the Admiralty, and Inspector-General, Royal School of Naval Architecture and Marine Engineering, South Kensington Museum.

41. A good knowledge of Plane and Spherical Trigonometry, of the definitions and terms used in Nautical Astronomy and of the various measurements of time and their mutual conversions will be required, as well as skill in the use of logarithmic tables, and neatness, order, and accuracy in the numerical solutions of problems.

42. The candidate should understand the construction of charts; the nature and laws of circular storms; great circle sailing, &c.; the methods of determining the latitude, longitude, variation of the compass, and error and rate of a chronometer by astronomical observations, with the demonstrations of the formulæ employed; the use of nautical astronomical instruments, &c.

43. Text Books:—The Nautical Almanac (*Murray*). Riddle's Navigation and Nautical Astronomy (*Law, Essex-street*).

44. N.B.—Candidates in this subject should be allowed the use of the Nautical Almanac for the current year and Tables during the Examination.

\*.\* Candidates intending to be examined in this subject should request the Secretary of their Local Board to communicate such intention to the Secretary of the Society of Arts, before the 1st February. (See notice at page 677).

#### X.—PRINCIPLES OF MECHANICS.

*Examiner.*—Rev. Jonathan Bates, M.A., late Fellow of Gonville and Caius College, Cambridge.

45. The properties of matter, solid, fluid, and gaseous.

46. Statics: The composition, resolution, and equilibrium of pressures acting on a material particle, and on constrained particles; machines; attractions.

47. Dynamics: The laws of motion; impact, projectiles; constrained motion; central forces; oscillation.

48. Rigid Dynamics: Motion of a rigid body about a point;—of a free rigid body;—of a system of rigid bodies.

49. Hydrostatics: Pressures of fluids; equilibrium of floating bodies; specific gravity; elastic fluids; machines; temperature and heat; steam; evaporation.

50. Hydrodynamics: Motion and resistance of fluids in tubes, &c.; waves and tides.

51. Pneumatics: Mechanical properties of air; the barometer, and other machines illustrating the mechanical properties of air.

52. Text Books:—Todhunter's Statics, or Parkinson's Mechanics. Goodwin's Mathematics. Miller's, Phear's, or Besant's Hydrostatics. Webster's Theory of Fluids. The treatises on these subjects in Orr's Circle of the Sciences. Golding Bird's Elements of Natural Philosophy, by C. Brooke (*Churchill*). Lardner's Handbooks of Natural Philosophy. Tate's Examples in Mechanics. Baker's Statics and Dynamics (*Weale's Series*). Twisden's Practical Mechanics. Rankine's Applied Mechanics. Rankine's Steam Engine and other Prime Movers.

53. The Examiner, in his report on the work last year, says:—"I regret to observe that many of the candidates have scarcely appreciated the gravity of the examination, for they are either apparently unfit to pass it, or have not bestowed sufficient study in order to master the first principles of the subject on which questions, for the most part of no very high order, but suited to test a respectable acquaintance, have been submitted to them."

#### XI.—PRACTICAL MECHANICS.

*Examiner.*—T. M. Goodeve, Esq., Professor of Mechanics at the Royal Military Academy, Woolwich.

54. The applications of the principles of Mechanism to Simple Machines. The Steam Engine.

55. Text Books:—Bourne's Catechism of the Steam Engine (*Longmans*). Scott Russell on the Steam Engine. Nasmyth's Elements of Mechanism, with remarks on Tools and Machinery (*Weale*). Goodeve's Elements of Mechanism, second edition (*Longmans*).

#### XII.—MAGNETISM AND ELECTRICITY.

*Examiner.*—Charles Brooke, Esq., M.A., F.R.S., Pres. M.S.

56. Construction and Properties of Magnets; Magnetic Instruments; Terrestrial Magnetism; the Mariner's Compass and its deviations in iron ships; Diamagnetism.

57. Franklinic Electricity; Voltaic Electricity; Electro-metallurgy; Electro-dynamics; Electro-telegraphy; Thermo-Electricity; Organic Electricity.

58. Text Books:—Elements of Natural Philosophy, by C. Brooke (*Churchill*). Lardner's Handbooks of Natural Philosophy (*Walton and Maberly*). Ganot, Elements of Physics (translated). Jamin, Cours de Physique, Becquerel, Traité de l'Electricité et de Magnétisme.

59. The Examiner, in his report on last year's papers, says:—"The Electric Telegraph, and especially its mechanism, being the most important practical and commercial bearing of the whole subject, has not generally met with the attention to which it is entitled."

#### XIII.—LIGHT AND HEAT.

*Examiner.*—Richard Potter, Esq., A.M., late Professor of Natural Philosophy and Astronomy in University College, London.

60. What is the sense of sight?—ancient theories—modern definitions and hypotheses of the nature of light—the especial privileges of animals which possess organs of vision—the simple laws or properties of light required to be known before we can discuss the structure of the eye, and the construction of telescopes, microscopes, and other optical instruments—what are foci of pencils of rays—how formed by reflection and refraction—real and virtual foci—optical images real and virtual—how do they occur in optical instruments.

61. Why do we distinguish between Physical and Geometrical optics?—what are double refraction of light—polarization of light—interference of light—examples of these properties, how shown—phenomena of recurring

colours—examples—how are explained the colours of the soap-bubble—the colours seen on looking towards a light through the feathers of small birds—the colours of mother-of-pearl—the rainbow, &c., &c.—the laws of the interference of polarized light—to describe cases of these splendid phenomena.

62. What are the definitions of heat, radiant, latent, and sensible?—What is meant by caloric?—hypotheses of the nature of heat—capacity of bodies for heat—the temperature of bodies—how measured by instruments—descriptions of thermometers and pyrometers—the scales of thermometers—how compared—how the volumes of solids, liquids, and gases depend on their temperature—absolute zero of cold—elastic force of vapours and gases produced by heat employed in steam and air engines—winds from the unequal heat of the atmosphere. What are the connexions and analogies of heat and light?

63. Text Books:—The Library of Useful Knowledge. Brewster's Optics (Cabinet Cyclopædia). Potter's Physical Optics, the descriptive and experimental treatise or first part (*Walton and Maberly*).

#### XIV.—CHEMISTRY.

*Examiner.*—A. W. Williamson, Esq., F.R.S., Professor of Chemistry, University College, London.

64. Preparation and properties of the chief gases, acids, bases, and salts. Laws of combining proportion by weight and by volume. Analytical processes for the detection and separation of metals, acids, &c. Preparation and distinctive properties of the chief kinds of alcohol, of organic bases, fixed and volatile organic acids, sugars, woody fibre, starch, &c.

65. Candidates are expected to be able to explain chemical reactions by the use of symbols. Questions illustrative of general principles will be selected from the following, amongst other manufactures:—Metallurgy of lead, iron, and copper; bleaching, dyeing, soap-boiling, tanning; the manufacture of coal-gas, sulphuric acid, soda-ash, &c.

66. Text books:—Miller's Elements of Chemistry, Williamson's Chemistry for Students.

#### XV.—MINING AND METALLURGY.

*Examiner.*—J. Arthur Phillips, Esq., Civil Engineer, Graduate of the Imperial School of Mines of France, &c.

67. Candidates should be able to identify with facility the ores of the more common metals, and be acquainted with their chemical composition. They should also be familiar with the forms of occurrence of the various metallic ores, and the usual methods employed for their extraction and subsequent purification by crushing, stamping, washing, &c. Underground surveying, the principles of ventilation, particularly as applicable to collieries; a knowledge of furnace assaying, and a general acquaintance with the metallurgy of the more important metals are also required.

68. First-class certificates can be given to those only who have either acquired some practical knowledge of mining, or who possess a special acquaintance with the metallurgy of at least one of the useful metals.

69. Text Books:—Dana's Mineralogy (*Trübner and Co.*, Paternoster-row.) Mitchell's Assaying (*Baillière*). Manual of Metallurgy (*Griffin*). Useful Metals and their Alloys (*Houlston and Wright*). Ure's Dictionary of Arts, Manufactures, and Mines (*Longmans*). Percy's Metallurgy (*Longmans*). Metallurgy of Iron, Truran (*Spon*). Mining and Metallurgy of Gold and Silver (*Spon*).

\* Candidates intending to be examined in this subject should request the Secretary of their Local Board to communicate such intention to the Secretary of the Society of Arts, before the 1st February. (See notice at page 677.)

#### XVI.—BOTANY.

*Examiner.*—Daniel Oliver, Esq., F.R.S., F.L.S., Keeper of the Herbarium at the Royal Gardens, Kew, and Professor of Botany in University College, London.

70. Sect. I.—The Structure of Plants and Vegetable

Physiology. The Functions of the Various Organs, and their Morphological Relations. The Nature of the Principal Tissues. The meaning of Botanical Terms. The application of Structural and Physiological Facts to Practical Purposes.

71. Sect. II.—Systematic Botany. The general Principles upon which the Classification of Plants is based. The distinctive characters of the principal British Natural Orders of Plants. Naming Common Wild Flowers at Sight. The sources of the most important Economic Vegetable Products:—Timbers, Fibres, Fruits, Drugs, &c.

72. Sect. III.—Descriptive Botany. The Art of Describing Plants correctly in Scientific Language.\*

73. Text Books:—Lindley's School Botany (*Bradbury and Evans*). Oliver's Lessons in Elementary Botany (*Macmillan*). Lindley's Theory and Practice of Horticulture (*Longmans*). Oliver's Guide to the Kew Museums (pamphlet) (*L. Reeve and Co.*).

74. Candidates will be expected to return three correct answers to questions in Section I., three in Section II., and at least two of the plants must be described and referred to their respective natural orders in Section III.

75. Students are very strongly recommended to the frequent practice of describing plants; at first on forms or "schedules," as given in Professor Oliver's "Lessons," page 59, and, when sufficiently advanced, in detail, as in the examples given at page 298 of the same work, and in Dr. Lindley's "School Botany."

#### XVII.—FLORICULTURE.

*Examiner.*—Thomas Moore, Esq., F.L.S., Curator of the Botanic Gardens, Chelsea, and Floral Director of the Royal Horticultural Society.

76. The Flowers of the different seasons available for Garden and Greenhouse decoration: how obtainable, whether by natural or artificial means, and under what modes of treatment.

77. Special Culture:—Ferns, Orchids, Cacti, Heaths, Hardy Annuals, Bedding Plants.

78. Practical Operations:—Potting; Planting; Pruning; Training; Watering; Propagation, the various modes of, and their special adaptations.

79. Flower-garden, Pleasure-ground, and Shrubbery:—Planting, materials for, and their arrangement; Flowering plants, Foliage plants; Herbaceous plants; Rock plants; Florists' flowers. Sub-Tropical gardening. Geothermal culture. Lawns, formation and management of.

80. Influence of Cultivation on the formation and development of buds—leaf buds and blossom buds. Action of Light on Plants. Flower forcing. Soils, nature and properties of. Composts for different classes of plants.

81. Acclimatization. Improvement or ennobling of races; by Selection; by Hybridization and Cross-breeding.

82. Construction and management of houses for plant culture; Atmospheric conditions; Heat; Moisture; Shade; Ventilation; Glazing. Ward's cases.

83. Text Books:—Lindley's Theory and Practice of Horticulture (*Longmans*). McIntosh's Book of the Garden. (*Blackwood and Sons*). Thompson's Gardener's Assistant (*Blackie and Son*). Thompson's Handy Book of the Flower Garden (*Blackwood and Sons*). Glenny's Hand-book of Practical Gardening (*Houlston and Wright*). Williams' Select Ferns (*Williams, Holloway*).

84. The Examiner, in speaking of last year's papers, says:—"There is a manifest deficiency in regard to the correct spelling of the names of plants."

\* Living plants are provided by the Society for this examination.

## XVIII.—FRUIT AND VEGETABLE CULTURE.

*Examiner.*—Robert Hogg, Esq. LL.D., F.L.S.

85. Sect. I.—Fruit-Tree Culture.—Kinds of Fruits adapted for various soils and exposures: The Propagation, Pruning, and Training of Fruit-trees. The Structure and Functions of the Organs of Trees, considered in their relation to growth and reproduction. The Forcing of Fruit-trees, and their Cultivation under glass, both in and out of pots. The Theory of Ripening, and the Principles that ought to Regulate the Preservation of Fruits after they are Ripe or their subsequent Maturation. The Packing of fruit for transmission to great distances.

86. Sect. II.—Vegetable Culture.—The kinds and quantities of vegetable seeds and roots required for cropping gardens of given dimensions. The most approved mode of culture of the different kinds of vegetables and salads. The preparation of fermenting materials for artificial heating. The forcing of vegetables and salads.

87. Sect. III.—General subjects.—Soils, Water, Atmospheric Air, Light and Heat, in their relation to the successful cultivation of Fruit and Vegetables. Manures and their application. The Diseases and Insects to which Fruits-trees and Vegetables are subject, and their remedies. The erection, heating, and ventilation of garden structures.

88. Text Books:—Lindley's Theory and Practice of Horticulture (*Longmans*). The Cottage Gardener's Dictionary (*Bell and Daldy*). Hogg's Fruit Manual, 3rd edition (171, *Fleet-street*). Rivers' Miniature Fruit Garden (*Longmans*). Bréhaut's Modern Peach Pruner (171, *Fleet-street*).

89. The Examiner, in his report on last year's papers, says:—"In subjects relating to culture, the answers are generally good; but in almost all cases, where those under consideration are the identification and nomenclature of the different varieties of fruits and vegetables, there is a great deficiency. I would therefore urge on candidates to study the individual characteristics of both fruits and vegetables, so that they may be able readily to distinguish one variety from another, and to acquaint themselves with the conditions under which the numerous varieties are known to succeed best."

## XIX.—ANIMAL PHYSIOLOGY IN RELATION TO HEALTH.

*Examiner.*—Dr. Michael Foster, Director of the Physiological Laboratory, and Teacher of Practical Physiology and Histology, University College, London.

90. The general principles of Animal Physiology, and the application of them to the preservation of health and to the wants and emergencies of daily life.

91. Text Books:—Huxley's Lessons in Elementary Physiology (*Macmillan*). Carpenter's Animal Physiology, 1859 (*Bohn*). Mapother's Lectures on Public Health (*Longmans*). Lardner's Animal Physics (*Walton and Maberly*). Translation of Milne Edwards' Manual of Zoology (*Renshaw*). Marshall's Description of the Human Body, with Atlas (*Day and Son*), for details of Anatomy. Marshall's outlines of Physiology (*Longmans*) for advanced students.

92. The Examiner, in his report on last year's papers, says:—"There was a display of technical terms, often incorrect, and very frequently quite irrelevant to the question, and there was much bad spelling."

## XX.—DOMESTIC ECONOMY.

*Examiner.*—Edward Carleton Tafnell, Esq., one of Her Majesty's Inspectors of Schools.

93. Candidates will be expected to possess such a knowledge of the essential elements of Mechanical and Chemical Physics, Chemistry,\* and Physiology, and of the general outlines of Natural History, as may enable them to describe the origin and properties of the articles, and the rationale of the processes indicated or suggested

by the following heads, as well as to explain the practical rules which science suggests for the promotion of health and comfort, and for turning limited means to the best advantage:—

94. Dwellings for town or country; site, general design, details of parts, materials and processes of construction and decoration; fixtures and fittings; furniture, fabrics, and clothing; the philosophy of food based on the functions and requirements of the human frame, and on the chemical and hygienic properties of proximate constituents; unwholesome food; adulterations; preservation; condiments; culinary processes; refreshing, stimulating, and intoxicating beverages; fuel and other household stores; means for promoting a vigorous development of the frame, and for maintaining the healthy exercise of its functions; means of safety; the care of the sick; household management and accounts; best ways of investing savings and of providing against emergencies.

95. The questions will be comprehensively framed, so as to give to candidates a free scope for making evident the extent of their studies in the various departments of Domestic Economy. Sound practical notions of the most essential points throughout the whole range of subjects are desired, rather than a deep knowledge of a few of them.

96. Text Books:—Tegetmeier's Domestic Economy (*Home and Colonial School Society, Gray's Inn-road*). Healthy Dwellings, &c., a lecture by Henry Roberts, F.S.A. (*Ladies' Sanitary Association, 8, Pont-street, Belgrave-square*). The Useful Arts employed in the Construction of Dwelling-houses; in the Production of Clothing and of Food (*Longmans*). Lankester's Lectures on Food, 1st and 2nd Course. Tomlinson's Warming and Ventilating (*Weale's Series*). The necessary Physical Chemical, and Physiological knowledge may be obtained from Chambers's Educational Course on the Sciences (*W. and R. Chambers*).

## XXI.—POLITICAL ECONOMY.

*Examiner.*—Henry Fawcett, Esq., M.A., M.P., Professor of Political Economy in the University of Cambridge.

97. This science investigates the laws which regulate the production, the distribution, and the exchange of wealth. The subject embraces questions which concern not only the wealth of nations, but also the wealth of individuals.

98. The books recommended to be read are "Principles of Political Economy," by Mr. J. S. Mill (cheap edition); "A Manual of Political Economy," by Professor Fawcett; or "A Manual of Political Economy," by Professor Thorold Rogers. These three books are mentioned in the order of their length, Mr. Mill's book being by far the most complete treatise which exists on Political Economy.

## XXII.—CIVIL GOVERNMENT AND THE LAWS OF ENGLAND.

*Examiner.*—Charles Neate, Esq., M.A., M.P., late Professor of Political Economy in the University of Oxford.

99. Candidates who aspire only to a second or third-class certificate, should study Creasy's Rise and Progress of the English Constitution (*Bentley, New Burlington-street*).

100. Candidates aspiring to a first-class certificate should also study the 3rd and 4th books of Stephens' Commentaries on the Laws of England. The earlier editions, which are often obtainable at a reduced price, may be used, so long as they are not earlier than the 3rd edition.

## XXIII.—GEOGRAPHY.

*Examiner.*—Wm. Hughes, Esq., F.R.G.S., Professor of Geography in King's College, London.

101. Candidates must show a sound knowledge of Elementary Geography, physical and descriptive. Such knowledge must embrace an acquaintance with at least the outlines of the great natural features of the globe,

\* The use of symbols and equivalents will be optional.

the political divisions of countries, and the localities of towns and other places of importance. This knowledge will be looked for in fuller extent with regard to the British Islands, and the various portions of the British Empire, than with regard to other countries. The recent changes in the map of Europe—especially in the cases of Germany and Italy—with the altered relationships between the various German States, may also be referred to as amongst the topics that prominently demand attention on the part of the geographical student. Australia, Canada, and Germany (the last-named with reference to the changes consequent on the war of 1866), are proposed as subjects for more especial study on the part of the intending candidates for the ensuing year's examinations. In evidence of the knowledge possessed regarding those regions, the candidate will be required to sketch, from memory, a map either of Canada, or of any single European country, that may be named by the examiner. Such sketches need not possess accuracy of detail, but should at least show the general direction of coast-lines, mountain-chains, or river-courses, with the localities and names of the principal towns.

102. Candidates who aim at the highest class of certificate should also be prepared to answer such questions upon Geography, in its relation to the Physical Sciences and the History of Mankind, as involve a general acquaintance with the subject of climate, the laws of Meteorology, the Distribution of Plants and Animals over the Globe, the leading outlines of Geology, the Ethnographic Division of the Human Race, and the commercial resources of different lands. This kind of knowledge is looked for, not in place of geographical knowledge of a more elementary kind, but as supplementary to it, and throughout based upon it.

103. Text Books:—Manual of Geography, by William Hughes (*Longmans*). Geography of British History, by William Hughes (*Longmans*). Guyot's Earth and Man (*Longmans*). Page's Introductory Text Book of Geology (*Blackwood*). The School Physical Atlas (*either Johnstone's, Phillips's, or that published by the National Society*).

104. The Examiner, in his report on last year's papers, says:—"The number of failures is large. I feel sure that in many cases the failure is due not so much to mere want of sufficient preparation as to absence of a thoughtful appreciation of the real nature of the task undertaken. In the case of the greater number of failures (and in not a few of those ranked as 'third class') the candidates seemed to have supposed a mere schoolboy treatment of the subject to involve all that was required; and no preparation for any higher test than would be applied to ordinary school geography—and that of a very elementary kind—appears to have been resorted to. If the candidates were to examine more fully the conditions of the programme issued by the Society, and to pay stricter attention to its injunctions and recommendations, they would stand a better chance of successful competition for the higher honours at its disposal. I venture to suggest whether more might not be done through the medium of the preliminary examinations, in furtherance of such a purpose. I can only repeat what I have urged on former occasions—that methodised study, with the aid of good appliances, directed persistently (for at least some length of time) to a definite object, can alone lead to the desired result. Mere generalities and loose scraps of information will not suffice. Geography is nothing if it be not precise and exact in detail, as well as comprehensive in its scope."

#### XXIV.—ENGLISH HISTORY.

*Examiner*.—The Rev. J. S. Brewer, M.A., Professor of Modern History in King's College, London.

105. English History and English Constitutional History.

106. Text Books:—Manual of English History, by Ross; or The Student's Hume. Creasy's English Constitution.

107. Special subject:—The Reign of Queen Anne. Lingard.

108. The Examiner, in his report on last year's papers, says:—"I regret to say that they contain more numerous instances of flagrant bad spelling than on any previous occasion. I think the different secretaries of the Institutions in Union with the Society of Arts should have their attention called to the fact that the candidates, in gathering up their papers, do not always put them together with due regard to the pagination. The consequence is that the Examiner is under the necessity of re-arranging the papers of some of the candidates, which is at times very perplexing."

#### XXV.—ENGLISH LITERATURE.

*Examiner*.—Rev. Samuel Clark, M.A., Chairman of the Board of Examiners.

109. Any two, but not more than two, of the authors in the following list may be taken up for examination:—Shakspeare—Julius Caesar; Henry VIII.; The Tempest. Morris's Specimens of Early English (Clarendon Press Series), from p. 184 to p. 378. Bacon—The Essays. Milton—Paradise Lost, books i.—viii.

110. Candidates are recommended to make a very careful study of the text of the authors they may select. The questions on each author will be divided into two sections, the first intended to test the candidate's acquaintance with the text, the second his knowledge of the subject matter, and his critical and literary information. Full marks will not be given for answers in the second section if those in the first section do not prove satisfactory. No marks will be given for anything beyond answers to the questions.

#### XXVI.—LOGIC AND MENTAL SCIENCE.

*Examiner*.—J. D. Morell, Esq., LL.D., and one of Her Majesty's Inspectors of Schools.

111. Logic: Candidates will be expected to answer questions on the different processes of thought, and the symbols by which they are expressed. Every candidate must be prepared to analyse examples of reasoning, and to detect fallacies.

112. Text Books: Whateley's Elements of Logic, or Morell's Handbook of Logic.

113. A Candidate for a second or third-class Certificate will be expected to prepare, in addition, any one of the following books which he may select:—Mill's System of Logic, Book III., Of Induction; Dugald Stewart's Outlines of Moral Philosophy (McCosh's Edition); or Sir William Hamilton's Lectures on Metaphysics, Lectures xx. to xl.

114. A Candidate for a first-class Certificate will be expected to prepare any two of these works which he may select.

#### XXVII.—LATIN AND ROMAN HISTORY.

*Examiner*.—Rev. F. Temple, D.D., Head Master of Rugby School.

115. Cicero; II. Philippic. Ovid Metam. Lib. v.

116. Roman History to the death of Augustus Caesar. Text Book:—Liddell's History of Rome, in one volume.

#### XXVIII.—FRENCH.

*Examiner*.—Alphonse Mariette, Esq., M.A., Professor of French, King's College, London.

117. The Examination Paper will be divided into three parts.

118. The first will comprise grammatical questions and an extract from a modern French writer, to be translated into English. Candidates merely aiming at a 3rd class certificate should confine themselves to this first part.

119. The second part will comprise, together with a few grammatical questions, an English extract to be translated into French, and a list of idiomatic expressions to be rendered from French into English, or *vice versa*. This should be done satisfactorily by the Candidate who aims at a 2nd class certificate.



120. In the third part, Candidates for a 1st class certificate will have to translate an English extract into French (to which great importance is attached), and to answer properly (*in French*) some elementary questions on the two following subjects:—

1. French literature during the fifteenth century and first half of the sixteenth.

2. The History of France, from the accession of Charlemagne to the death of Louis IX. (768—1270).

121. Books recommended:—*Mariette: Half-Hours of French translation (Williams and Norgate, London and Edinburgh).* Nisard: *Histoire de la Littérature Française*, vol. I. (*Williams and Norgate*), or *Demogrot: Histoire de la Littérature Française (Williams and Norgate)*. Duruy: *Histoire de France*, vol. I. (*Williams and Norgate*).

122. The Examiner, in his report on last year's papers, says:—"The translation of English into French continues the weakest part, and bears throughout the evidence of extremely superficial study. In some groups of papers, all bearing a strong family likeness, it is grievous to notice the effects of that cramming system which has lately crept into so many school-rooms, and which it is the duty of all earnest educators to denounce and discourage. I would again warn the candidates, and especially their teachers, that two or three foolscap sheets of ready-made literature and 'cut and dried' history, however accurately got up, cannot secure any great number of marks when, of all the grammatical questions in the same paper, not one is correctly answered, or when nearly every word in the translation is an offence against one or other of the most elementary rules of the language."

#### XXIX.—GERMAN.

*Examiner.*—Dr. Buchheim, Professor of German in King's College, London, Examiner in German to the University of London, etc.

123. The Examination paper will consist of four Sections. The first will contain extracts from the works recommended for reading; the second grammatical questions and idioms; the third English phrases, an extract from an English author (both to be turned into German); and the fourth, questions on the history and literature of Germany. The questions in the former will be confined to the period from 1056 to 1125; and in the latter to that from 1517 to 1624.

124. Candidates for a third-class certificate should be prepared to translate one extract at least, either from the first act of "*Wilhelm Tell*" or from the first two cantos of "*Hermann und Dorothea*," and to answer the first three grammatical questions in Section II.

125. Candidates for a second-class certificate will be expected to answer all the questions contained in Section II., besides translating one extract at least from the above-mentioned parts of "*Wilhelm Tell*," or "*Hermann und Dorothea*."

126. Candidates for a first-class certificate must translate two extracts—one from prose and another from poetry—and, in addition, satisfy the Examiner with reference to the questions contained in Sections II., III. and IV., of which the translation of an English passage into German, the historical and literary questions and the writing of a German Essay, will form an essential part.

127. Books Recommended:—*Schiller's Wilhelm Tell (Act I).* Goethe's *Hermann und Dorothea* (the two first cantos: *Kalliope and Terpsichore*). *Schiller's Dreissigjähriger Krieg (Book V. first half).* *Kohlrausch's Deutsche Geschichte (Heinrich IV. and Heinrich V.)* *Vilmar's Geschichte der Deutschen National Literatur (Dritte Periode).*

#### XXX.—ITALIAN.

*Examiner.*—Signor Pistrucci, Professor of Italian in King's College, London.

128. Candidates for first-class certificates will be required—(1st) To translate into English passages from

some of the principal Italian poets and historians, and to answer the grammatical questions which may be added to those passages. (2nd) They will also have to translate into Italian an extract from some English author; (3rd) and turn a few familiar idioms into their equivalents, from Italian into French, and *vice versa*.

129. For second and third-class certificates candidates will translate into English some selection from *Metastasio's drammi*, and *Foscolo* or *Manzoni's* prose works, and answer a certain number of grammatical questions.

130. The Examiner, in his remarks on last year's work, says:—"In the papers for this year, whilst I discover some small improvement as regards grammatical rules, I find evidence still of sensible deficiency with respect to forms of expression and the construction of Italian. More extended reading is also absolutely necessary."

\*.\* Candidates intending to be examined in this subject should request the Secretary of their Local Board to communicate such intention to the Secretary of the Society of Arts before the 1st February. (See notice at page 677.)

#### XXXI.—SPANISH.

*Examiner.*—B. B. Aguirre, Esq., Lecturer on Spanish in King's College, London.

131. Candidates for a first-class certificate will have to translate an English passage into Spanish, to render into English or French several idiomatic phrases, and to write in Spanish a short essay.

132. Candidates for a second-class certificate will have to translate from English into Spanish the third part of the passage for the first-class, two letters of business, and to answer several questions upon the Spanish verbs.

133. Candidates for a third-class certificate will have to translate from Spanish into English, and to answer several grammatical questions.

134. Books recommended:—*Spanish Gil Blas; Nueva Floresta Española*, por Dn. Ignacio Castellar; *Trozos escojidos delos mejores hablitas españolas*, por Dn. Carlos Ochoa; *Estudios filológicos*, por Dn. Manuel Martinez de Morentin.—*Don Quixote* translated into English by Charles Jarvis.

135. The Examiner in his remarks on last year's papers, says:—"Some improvement is evinced this year as compared with the preceding, notwithstanding some of the candidates show themselves defective in the rules of grammar in the translation from English into Spanish, which can be removed by a careful attention to syntax."

#### XXXII.—FREEHAND DRAWING.

*Examiner.*—F. S. Cary, Esq.

136. In freehand drawing the Candidate will be required to show a practical knowledge of the principles usually applied in the imitation of natural and artificial forms, such as furniture, manufactured articles, ornament, foliage, and the human form.

#### XXXIII.—PRACTICAL GEOMETRY.

*Examiner.*—Thomas Bradley, Esq., Professor of Practical Geometry in King's College, London, and at the Royal Military Academy, Woolwich.

137. Practical Geometry, or Geometrical Drawing, is required by the Mechanic, Engineer, Builder, and by all in any way connected with the arts of construction. The Candidates will be examined in Practical Plane Geometry, the construction of right line figures of given areas, and of those curves which are required in the arts; in Practical Solid Geometry, Elementary Problems on the line and plane, in space, and their combinations, the representation by orthographic projection of simple solids from conditions; in the principles of Development as used in the construction of Maps, &c.; and in Elementary Perspective Projection as far as it is required by the Architect.

138. Text Books:—*Geometry, Plane, Solid, and Spherical (Library of Useful Knowledge)* is especially recommended as a work to be studied on Theoretical Geometry. *Elements of Geometrical Drawing*, published

by the Committee of Council on Education, two parts (*Chapman and Hall*). Dr. Woolley's work on Descriptive Geometry. Heather's Descriptive Geometry. Also the following French works:—*Elémens de Géométrie Descriptive*, par S. F. Lacroix; *Traité de Géométrie Descriptive*, par Lefebure de Fourcy; *Nouveau Cours raisonné de Dessin Industriel*, par Armengaud, aîné, et Armengaud, jeune, et Amoureux; Bardin's Works on Descriptive Geometry.

139. The Examiner, in his remarks on the work done by the candidates last year, says:—"Even the plane geometry is greatly inferior, and the drawing not so good; but of any knowledge of the geometry of the plane and line in combination there is little indication, and there is often a reckless neglect or misconception of the conditions of the question."

#### XXXIV.—MECHANICAL DRAWING.

*Examiner.*—George Fuller, Esq., C.E., Professor of Engineering in University College, London.

140. Candidates in Mechanical Drawing will have given to them the principal dimensions of some simple pieces of machinery, and they will be required, from the dimensions given, to make drawings of the machines, showing in their plans, elevations, and sections all the details that would be required for their manufacture. Correctness of design in the details and neatness of drawing are the two essentials.

141. The Engineer and Machinist's Drawing Book (*Blackie and Son*); and, in general, all well illustrated works on machinery, will show the candidate the kind of work that will be required of him.

#### XXXV.—THEORY OF MUSIC.

*Examiner.*—John Hullah, Esq.

142. Notation, the modern modes, intervals, time signatures, the stave, transposition, modulation, terms and characters in common use.

143. The Elements of Harmony.

144. Musical History and Biography.

145. Arrangements must be made, in the Previous Examinations by the Local Boards, to test Candidates, by oral examination, in their knowledge or appreciation of the *sound* of musical successions and combinations. A form of the test to be used for this purpose by the Local Board at the Previous Examination, will be sent by the Council to such Local Boards as may *apply for it* in due time before the Previous Examination.

146. The Examiner, in speaking of the work done by the Candidates last year, says:—"In some of the papers there are many examples of simple processes done in a very slovenly way; *e.g.*, putting compressed into full score, showing imperfect knowledge of the theory of the stave. Some candidates still attempt the harmony and counterpoint questions, evidently without having had the slightest preparation for them."

#### XXXVI.—ELEMENTARY MUSICAL COMPOSITION (TONIC SOL-FA SYSTEM.)

*Examiner.*—G. A. Macfarren, Esq.

147. The candidate will be required to compose a tune and harmonise it (note against note) for four voices, the initial notes of the melody, the number of measures, the number and character of the cadences, and the changes of key being given.

148. A verse of poetry being given, the candidate will compose for it an air with a bass, properly accentuating the words and generally expressing their sentiment.

149. The candidate will write a short composition for four voices of a given length and to given words.

150. The exercises may be written either in the established or in the Tonic Sol-fa notation, and Candidates will be admitted, on whatever system they have studied, provided they pass the previous test, which will be prepared by the examiner, and furnished to each Local Board, on application to the Secretary of the Society of Arts.

## PRIZES FOR 1869.

### THE PRINCE CONSORT'S PRIZE.

151. His Royal Highness, the late President of the Society, was pleased to offer annually to the candidate who, obtaining a certificate of the first-class in the current year, shall have obtained, in that year and the three years immediately preceding it, the greatest number of such certificates,\* a PRIZE OF TWENTY-FIVE GUINEAS, and this Prize Her Majesty the Queen has graciously intimated her intention to continue. This Prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate from the Society of Arts, setting forth the special character of the Prize, and the various certificates for which it was granted.

### GENERAL PRIZES.

\* \* \* None of these Prizes will be awarded to a Candidate who does not obtain a Certificate of the First-class in the subject.

1. Arithmetic (F) .....	{ First Prize, £5. Second Prize, £3.	8. Conic Sections .....	{ First Prize, £5. Second Prize, £3.
2.† The Metrical System (F) ....	{ First Prize, £5. Second Prize, £3.	9. Navigation and Nautical Astronomy .....	{ First Prize, £5. Second Prize, £3.
3. Book-keeping (F) .....	{ First Prize, £5. Second Prize, £3.	10. Principles of Mechanics ....	{ First Prize, £5. Second Prize, £3.
4. Algebra .....	{ First Prize, £5. Second Prize, £3.	11. Practical Mechanics .....	{ First Prize, £5. Second Prize, £3.
5. Geometry .....	{ First Prize, £5. Second Prize, £3.	12. Magnetism and Electricity ..	{ First Prize, £5. Second Prize, £3.
6. Mensuration .....	{ First Prize, £5. Second Prize, £3.	13. Light and Heat .....	{ First Prize, £5. Second Prize, £3.
7. Trigonometry .....	{ First Prize, £5. Second Prize, £3.	14. Chemistry .....	{ First Prize, £5. Second Prize, £3.

\* In case of equality in the number of such Certificates, the Council, in making the award, will take into consideration the ability shown by such Candidates in the examinations generally.

† These Prizes are offered by the Metrical Committee of the British Association for the Advancement of Science.

15. Mining and Metallurgy ....	{ First Prize, £5. Second Prize, £3.	26. Logic and Mental Science ..	{ First Prize, £5. Second Prize, £3.
16.*Botany .....	{ First Prize, £5. Second Prize, £3.	27. Latin and Roman History ..	{ First Prize, £5. Second Prize, £3.
17.*Floriculture .....	{ First Prize, £5. Second Prize, £3.	28. French (F) .....	{ First Prize, £5. Second Prize, £3.
18.*Fruit and Vegetable Culture	{ First Prize, £5. Second Prize, £3.	29. German (F) .....	{ First Prize, £5. Second Prize, £3.
19. Animal Physiology in relation to Health (F) .....	{ First Prize, £5. Second Prize, £3.	30. Italian (F) .....	{ First Prize, £5. Second Prize, £3.
20.*Domestic Economy (F) .....	{ First Prize, £5. Second Prize, £3.	31. Spanish (F) .....	{ First Prize, £5. Second Prize, £3.
21.*Political Economy (F) .....	{ First Prize, £5. Second Prize, £3.	32. Freehand Drawing (F) .....	{ First Prize, £5. Second Prize, £3.
22. Civil Government &c. ....	{ First Prize, £5. Second Prize, £3.	33. Practical Geometry (F) .....	{ First Prize, £5. Second Prize, £3.
23.*Geography (F) .....	{ First Prize, £5. Second Prize, £3.	34. Mechanical Drawing .....	{ First Prize, £5. Second Prize, £3.
24. English History (F) .....	{ First Prize, £5. Second Prize, £3.	35. Theory of Music (F) .....	{ First Prize, £5. Second Prize, £3.
25. English Literature (F) .....	{ First Prize, £5. Second Prize, £3.	36.†Elementary Musical Composi- tion (Tonic Sol-fa System) (F)	{ First Prize, £5. Second Prize, £3.

## SPECIAL PRIZES.

## COUNCIL PRIZE TO FEMALES.

152. The Council of the Society offers to the female candidate who, obtaining a certificate of the first-class in the current year, shall have obtained, in that year and the two years immediately preceding it, the greatest number of such certificates,‡ a PRIZE OF TEN GUINEAS. This Prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate from the Society of Arts, setting forth the special character of the Prize, and the various certificates for which it was granted.

153. The whole of the General Prizes are offered to female candidates on the same terms as to male candidates; and, in each of the subjects marked F, an additional prize of £2 is offered to the *female* candidate who gets the highest number of marks with a certificate of the first-class. This special prize may be taken with, or apart from, any other prize.

154. In addition to the First and Second Prizes in Political Economy offered by the Society of Arts, Mr. Harry Chester, a Vice-President of the Society, offers a Third Prize of £2, and three prizes of books, value £1 each, to candidates taking First-class Certificates in that subject.

155. In addition to the First and Second Prizes in Domestic Economy offered by the Society of Arts, Mr. Thomas Twining, a vice-President of the Society, offers a Third Prize of £2, and three prizes of books, value £1 each, to candidates taking First-class Certificates in that subject.

156. In addition to the Prizes in Geography, offered by the Society of Arts to candidates taking Certificates of the First-class, the President and Council of the Royal Geographical Society offer an additional prize of £5 to the candidate who, taking any grade of certificate in Geography, shall obtain the highest number of marks in that subject.

157. In addition to the Prizes in Botany, in Floriculture, and in Fruit and Vegetable Culture offered by the Society of Arts to Candidates taking Certificates of the First-class, the Council of the Royal Horticultural Society offers three additional prizes of £5, £3, and £1 respectively to the three Candidates who, taking any grade of Certificate in Botany, obtain the highest number of marks in that subject; also two additional prizes of £5 and £3 respectively to the two Candidates who, taking any grade of Certificate in Floriculture, obtain the highest number of marks in that subject; also two additional prizes of £5 and £3 respectively to the two Candidates who, taking any grade of Certificate in Fruit and Vegetable Culture, obtain the highest number of marks in that subject. These Prizes are offered only to Candidates who are *bonâ fide* professional gardeners.

158. In addition to the Prizes in Floriculture, and in Fruit and Vegetable Culture, offered by the Society of Arts to Candidates taking Certificates of the First-class, the Proprietors of the *Gardener's Chronicle* offer three additional prizes of £3, £2, and £1 respectively, to the three Candidates, being *bonâ fide* professional gardeners, who, obtaining a Second-class Certificate, at least, in Floriculture or Fruit and Vegetable Culture, shall obtain the highest number of marks in one of these subjects, and also a Second-class Certificate, at least, in Book-keeping or Mensuration.

\* For Extra Prizes in these subjects see paragraphs 154, 155, 156, 157, 158.

† These Prizes are offered by the Tonic Sol-fa Association.

‡ In case of equality in the number of such Certificates, the Council, in making the award, will take into consideration the ability shown by such Candidates in the examinations generally.

## LOCAL EDUCATIONAL BOARDS.

The following is a List of the places at which Local Boards have already been formed, with the names of the Secretaries, from whom intending Candidates and others may obtain information relative to the Examinations:—

LOCAL BOARDS.	SECRETARIES.
Aberdeen .....	Mr. Jas. Sinclair, Mechanics' Institution, Aberdeen.
Accrington.....	Mr. Miles N. Lightburne
Acomb, near York .....	Mr. T. Copley, Acomb.
Alderley Edge .....	Mr. G. W. Railton, Alderley Edge Institute.
Aldershot and Farnham District .....	Mr. Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot.
Alton .....	Mr. J. Bryant.
Ashford .....	Mr. T. Nesbit, 11, Dover-place, Ashford.
Ashton-under-Lyne ....	Mr. George Hay, Mechanics' Institute.
Bacup .....	Mr. J. Pilling, Bacup Mechanics' Institute.
Banbridge (Ireland) Literary and Mutual Improvement Society ...	Mr. Hugh McMullan, jun., Dromore-street.
Banbury .....	Mr. John H. Beale, Banbury.
Beeston (Leeds).....	Mr. W. Standeven.
Belfast Literary Institute .....	Rev. W. C. McCullagh.
„ Science School...	Mr. James McNeil, Belfast Academy.
Bessbrook (Newry) .....	Mr. Wm. J. Wonfor, Bessbrook.
Bewdley .....	Mr. J. Birtwistle.
Bilston .....	Hon. and Rev. A. Anson, St. Leonards, Bilston.
Birmingham and Midland Institute.....	Mr. Edwin Smith, Institute, Birmingham.
Bishop's Stortford.....	Mr. F. Woodham Nash, B.A., Sion House, Birchanger, Bishop's Stortford.
Blackburn .....	Messrs. Thomas Hand and H. Harrison, Mechanics' Institution.
Blandford .....	Mr. J. B. Green, architect, &c., Salisbury-st., Blandford.
Bodmin .....	Mr. Josias Phillips, Little Berry-cottage, Bodmin
Bolton Mechanics' Institution .....	Mr. Joseph Barton, Mechanics' Institution.
„ School of Science and Art .....	Rev. Joseph Lowe, M.A., Manchester-road, Bolton.
Bradford.....	Mr. J. Holbrey, Mechanics' Institution, Bradford.
Bredbury and Hatherlow .....	Mr. T. Greenwood, Hatherlow, near Stockport.
Brighton (for Sussex) ...	Mr. Barclay Phillips, 75, Lansdown-place, Brighton.
Bristol (Young Men's Christian Association) .	Mr. W. J. Morgan.
Bromley (Kent) .....	Mr. W. W. Baxter, Literary Institute.
Brompton (Kent) St. Mark's Science School	Mr. G. H. Gifford, 2, Lenem-place, Skinner-street, New Brompton, Kent.
Bromsgrove .....	Mr. W. Holyoake.
Burnley Mechanics' Institution .....	Mr. J. H. Scott, Mechanics' Institute.
„ Church Literary Institute.....	Mr. J. Wright Ashworth.
Burrage road (Plumstead) Evening Classes .....	Mr. Josiah Hammond.
Bury (Lancashire) .....	Mr. T. W. Probert, Manchester-road, Bury.
Bury St. Edmund's .....	Mr. John Jackson, Head Master of the Commercial School, Bury St. Edmund's.
Canterbury.....	Rev. E. H. Cross, 16, St. George's-terrace.
Carlisle (Mechanics' Institute) .....	Mrs. Jane Williamson, Mechanics' Institute, Carlisle.
„ (Working Men's Reading Room)	Mr. J. Short, Lord-street School.
Chapelton, near Bolton	Mr. M. Howarth, Victoria Mills, Chapelton, Bolton.
Chatham (St. Mary's Science School) .....	Mr. R. W. Coldwell, St. Mary's School-house, Military-road, Chatham.
Chelmsford.....	Mr. W. Cutts, Chelmsford.
Cheltenham Working Men's Club.....	Mr. W. Dugdale.
Chorley (Lancashire) ...	Mr. S. Blakeley, Mechanics' Institute.
Christchurch .....	Mr. W. Judd, F.C.S., High-street.
Clitheroe.....	Mr. J. Gornall, Moor-lane, Clitheroe.
Compstall, near Stockport	Mr. John Fernley, Literary Institute.
Cork (Young Men's Society) .....	Mr. W. C. Daly, 19, Leitrim-street.
Crewe .....	Mr. J. E. Cubbons, Mechanics' Institute, Crewe.
Dean Mills .....	Mr. W. Taylor.
Denton and Haughton...	Mr. John Collins, Broom-lane, Haughton, Denton, Manchester.
Deptford.....	Mr. T. Earland, 2, Wellington-grove, Greenwich-rd., S.E.
Derby .....	Mr. H. M. Holmes, Hon. Local Sec. to the Society of Arts, London-road, Derby.
Devonport .....	Mr. W. Mogg and Mr. Samuel Chapple, Mechanics' Institute, Devonport.
Droitwich .....	Mr. Jeacock.
Droylsden .....	Mr. James Blackburn, Educational Institute.
Dudley .....	Mr. Williams, Bluecoat School.
Earlstown .....	Mr. Charles Shaw, Earlstown, Newton-le-Willows.
East Lancashire Union of Mechanics' Institutions, Burnley .....	Mr. John Sutherland, Post-office, Burnley.
Eccleshill .....	Mr. Isaac Bakes, Mech. Inst., Eccleshill.
Ebley .....	Mr. H. Webb.
Edinburgh, Watt Institute and School of Art	Mr. F. W. Bedford, D.C.L., Heriot's Hospital, Edinburgh ( <i>Hon. Sec.</i> ), and Mr. W. T. McCulloch ( <i>Sec.</i> )
Evesham.....	Rev. M. Wood.
Failsworth .....	Mr. John Brierly.
Farsley, near Leeds .....	Mr. Arthur Kirk.
Faversham .....	Mr. Samuel G. Johnson, Town Clerk, Faversham.
Freetown (Glossop) .....	Mr. Thomas Haigh, Charles-town-road, Glossop.
Galgate .....	Mr. William Parkinson, Railway-cottage, Galgate, Lancaster.
Garforth (Leeds) .....	Mr. Arthur Woodhead.
Gilford (Ireland) Young Men's Mutual Improvement Society ...	Dr. Henry McBride, M.D., Gilford, County Down, Ireland
Glasgow Athenæum.....	Mr. John Allen, 13, Queen-street, Glasgow.

Glasgow Institution .....	Mr. John Craig, F.E.I.S., Glasgow Institute, 280, George-street, Glasgow.	London, Beauvoir College Evening Classes...	Mr. A. Chipperfield, Drapers' Hall, Throgmorton-street, E.C.
" Mechanics' Institution .....	Messrs. J. K. Dempster, and R. Bulloch, Mechanics' Institution, Glasgow.	" Birkbeck Literary and Scientific Institution .....	Mr. G. M. Norris, 29, Southampton - buildings, Chancery-lane, W.C.
" Popular Evening Classes, Andersonian University .....	Mr. George Martin, 11, Great Western-road, Glasgow.	" City of London College .....	Mr. H. W. Hansen, City of London College, Leadenhall-street, E.C.
" Tonic-Sol-Fa Choral Society .....	Mr. W. M. Miller.	" Hackney.....	Mr. H. Grey, Working Men's Inst., Triangle, Hackney, N.E.
Glodwick (Oldham) .....	Mr. J. Green, 3, Greenacres-road, Oldham.	" Lambeth.....	Mr. T. Heller, Hercules'-buildings, Lambeth, S.W.
Gloucester Free Library .....	Mr. W. Jeffery.	" Royal Polytechnic Institution Classes .....	Mr. James Cousens, Royal Polytechnic Institution.
Guisboro' (Yorkshire) ...	Messrs. W. Cockerlyne and J. Sanderson, Mechanics' Institution.	" St. Stephen's, Westminster .....	Mr. J. Cawood, St. Stephen's School, Westminster.
Halifax Mechanics' Institution .....	Mr. James Watson, Mechanics' Institution, Halifax.	" St. Thomas, Charterhouse Evening Classes .....	Mr. G. Phillipson, St. Thomas' Charterhouse School, E.C.
" Working Men's College .....	Mr. Geo. Gibb, Haley-hill, Halifax.	" Stepney Deanery .....	Rev. J. R. Holmes, 10, Montague-place, Poplar, E.
Hanley Castle .....	Mr. A. Shewell.	Louth .....	Mr. Benjamin Crow, Mechanics' Institution, Louth
Haslingden .....	Dr. J. Binns.	Macclesfield .....	Mr. W. Jeffery, Park-green, Macclesfield.
Hastings and St. Leonards .....	Mr. J. Savery, 12, York-buildings, Hastings.	Malvern .....	Dr. Marsden.
Haughton Dale .....	Mr. J. T. Fallows, Haughton Dale Works, Denton, Manchester.	Manchester M.I. ....	The Secretary of the Institution.
Hertford .....	Mr. J. L. Foster, and Rev. J. Davey, Hales's Grammar School, Hertford.	Marple .....	Mr. W. Walmsley, Hollin's Mill, Marple, Manchester.
Heywood .....	Mr. G. Fairbrother, Mechanics' Inst., Heywood.	Middlesbro'-on-Tees .....	Mr. W. Taylor, Mechanics' Institute, Middlesbro'-on-Tees.
Holbeck (Leeds) .....	Mr. E. B. Wade.	Mossley .....	Mr. James Holt, Mechanics' Inst., Mossley, near Manchester.
Holywell Green (near Halifax) .....	Mr. John Gledhill.	Newcastle - on - Tyne Church of England Institute .....	Mr. M. J. Forster, Maple-terrace, Newcastle-on-Tyne.
Huddersfield .....	Mr. Joseph Bate, Mechanics' Institution, Huddersfield.	New Mills, near Stockport .....	Mr. Edward Godward, Working Men's Institute.
Hull .....	Mr. P. Blackmore, 2, Charlotte-street, Hull.	New Swindon .....	Mr. J. H. Preece, Mech. Inst.
Hulme (Working Men's Institute) .....	Mr. G. T. Letch, Working-Men's Institute, City-road, Hulme.	Oldbury .....	Rev. H. B. Bowlby, Oldbury.
Hunslet (Leeds) .....	Mr. John C. Nicholson, White House-place.	Oldham Lyceum .....	Mr. W. Noton.
Hyde .....	Mr. W. Gee, Mechanics' Institute, Hyde.	Ossett (Wakefield) .....	Mr. J. W. Greenwood.
Ipswich .....	Mr. Edwin Barrett, 31, Cornhill, and Mr. Herbert Wright, Mechanics' Institution, Ipswich.	Over-Darwen.....	Mr. E. Neville.
Kidderminster Church of England Mutual Improvement Society ...	Rev. W. Packe.	Padiham, Church of England Evening School .....	Rev. P. Warburton.
Kidderminster M.I. ....	Mr. H. Fawcett.	Paisley .....	Mr. Charles Dalton Wason, St. George's School, Paisley.
King's Lynn .....	Mr. T. Burton, Checker-street.	Parsonstown, Ireland ...	Mr. Edward Morrison.
Kinver .....	Mr. T. Bolton, Hyde House, Stourbridge.	Patricroft (Manchester) ..	Mr. J. Hewitt, Mechanics' Institution.
Lancashire and Cheshire Union of Institutes (Central Board).....	Mr. Thomas Lawton, 3, St. James's-chambers, South King-street, Manchester.	Pembroke Dock .....	Mr. J. T. Cock, B.A.
Lancaster ..	Mr. T. H. Dalzell, Mechanics' Institute.	Poole .....	Mr. John T. Norton, West-street, Poole.
Leeds, Church Institute...	Rev. J. F. Wood.	Portsmouth .....	Mr. A. R. Robinson, 198, Lake-road, Landport.
" Mechanics' Institution .....	Mr. J. O. Dayson.	Preston .....	Mr. James Dunn, Avenham Institute, Preston.
" Young Men's Christian Association ..	Mr. W. H. Smith, Young Men's Christian Association, Leeds.	Ramsbottom .....	Mr. Enos Fenton, Public Institute, Ramsbottom, near Bury (Lanc.)
Lichfield.....	Rev. Thomas Dainty, Lichfield.	Rawtenstall .....	Mr. W. Kemp, Mechanics' Institute.
Liverpool Institute .....	Mr. Charles Sharp, the Institute, Liverpool.	Redditch.....	Mr. V. Milward.
Lomeshaye Even. School ..	Mr. Leonard Clement.	Richmond (Surrey) .....	Mr. F. G. Trevor, The Hermitage, Richmond, S.W.
London, Bayswater .....	Mr. C. Baker, 15, St. Petersburg-place, Bayswater, W.	Rotherham.....	Mr. W. Unwin, Rotherham.
		Rugby .....	Mr. F. E. Kitchener, M.A.
		Rusholme, Public Hall and Library .....	Mr. E. Wilde.

Sheerness Dockyard.....	Mr. J. Henry.
St. Helen's (Lancashire)	Mr. W. B. Stubbs, 20, Baldwin-street, St. Helen's.
Salford .....	Mr. J. Plant, F.G.S., Working Men's College, Salford.
Scarborough .....	Messrs. Thos. Shields and C. H. Moxey, Mechanics' Inst.
Slough .....	Mr. H. W. Ward, Alpha-street.
Smethwick .....	Mr. F. Talbot, Messrs. Chance's Library, Smethwick.
South Staffordshire Educational Association ...	Mr. F. Talbot, Messrs. Chance's Library, Smethwick.
Southampton .....	Mr. W. Johnson, Caprera Cottage, Bevois Mount, Southampton.
Southport .....	Dr. Craven, Athenæum, Southport.
Staleybridge .....	Mr. J. W. Wood, Mech. Inst., Staleybridge.
Stockport .....	Mr. M. Potts, Mech. Inst.
Stockton-on-Tees .....	Mr. T. H. Ainsworth.
Stourbridge .....	Rev. H. Sherrard, Stour-bridge.
"    Associated Institutes...	Rev. D. Maginnis.
Stroud .....	Mr. S. S. Dickinson.
Thirsk .....	Mr. R. D. Carter, Thirsk.
Tintwistle (near Manchester) .....	Mr. George Pickford.
Tottington (Bury) .....	Mr. J. Kenyon, Tottington Institute.
Wakefield .....	Mr. F. Stafford, Mechanics' Institution, Wakefield.
Walsall .....	Mr. J. Webb, Free Grammar School.
Waterford ... ..	Mr. James Budd, 5, King-st., Waterford.
Wednesbury .....	Rev. J. Winter.
Wellingborough .....	Mr. Thomas S. Curtis, Wellingborough.
Werneth (Oldham) .....	Mr. F. H. Chadderton, Mechanics' Institute, Werneth.
West Bromwich (1) .....	Rev. F. P. Hutton, Gold's Hill, West Bromwich.
West Bromwich (2) .....	Rev. J. Whewell, West Bromwich.
West Hartlepool .....	Messrs. E. Cory and J. P. Fea.
West Riding (Yorkshire), Educational Board ...	Mr. H. H. Sales, Mechanics' Institution, Leeds.
Whaleybridge .....	Mr. A. H. Colles, Whaley-bridge, near Stockport.
Whitby .....	Mr. W. G. Chiesman.
Willenhall .....	Mr. J. C. Tildesley, Willenhall.
Wolverhampton .....	Mr. J. N. Langley, Mowbray House, Wolverhampton.
Woolwich Arsenal .....	Mr. W. D. Keeble, Royal Laboratory, Woolwich.
"    St. Thomas' Parochial Schools	Mr. J. H. Norman.
"    Western Mission School Science Class .....	Mr. Louis J. Ruegg, 18, Bowater-crescent, Woolwich, S.E.
Worcester Catholic Institute .....	Rev. W. Waterworth.
"    Bridport Free Church Mutual Improvement Association	Mr. E. J. Lewis.
Worcestershire Union of Educational Institutes	Rev. G. D. Boyle, Kidderminster, and Mr. F. Marcus, Worcester.
York .....	Mr. R. Hall, 8, Feasgate, York.

## ELEMENTARY EXAMINATIONS.

The Society of Arts, ever since the establishment of its system of Examinations, has (while abstaining on its own part from examining students in elementary subjects) recommended the District Unions and Local Boards in connection with it to hold Examinations of this character as preparatory to the Final Examinations of the Society. In order to aid them in doing this, and at the same time to promote, as far as possible, a uniformity of standard all over the country, the following definite scheme of elementary examinations is recommended for the use of the District Unions and Local Boards. It is in two grades, and the candidates should be allowed to select either grade at their discretion.

## LOWER GRADE.

1. Every candidate must be examined in the first four rules of Arithmetic, simple and compound.
2. Female candidates must also be examined in plain needlework.
3. Male candidates must also be examined in one at least of the three following subjects:—

- A. A general knowledge of the Gospel History.
- B. The rudiments of English History.
- C. The rudiments of the Geography of England.

4. Fairly good writing and spelling, with good reading of a simple narrative will also be required.

5. A satisfactory examination will entitle the candidate to a certificate (of the Lower Grade) from the District Union or Local Board.

## HIGHER GRADE.

1. Every candidate must be examined in Arithmetic, including the Rule of Three, Decimal and Vulgar Fractions.
2. Every female candidate must also show proficiency in needlework.

3. Male candidates must also be examined in one at least of the four following subjects:—

- A. The facts of St. John's Gospel and the Acts of the Apostles.
- B. A general knowledge of English History, and especially of the reign of Queen Anne.
- C. The Geography of Great Britain and Ireland.
- D. English Grammar.

4. Candidates will be expected to write fairly, spell correctly, and express themselves grammatically.

5. A satisfactory examination will entitle the candidate to a certificate (of the Higher Grade) from the District Union or Local Board.

No candidates under 12 years of age should be admitted to either grade of these examinations.

The Secretary of any District Union or Local Board in connection with the Society of Arts, desiring to adopt this scheme of Elementary Examinations, must apply to the Secretary of the Society of Arts before the 10th of February, stating the number of *male* and *female* Candidates respectively desiring to be examined in *each* grade. Examination Papers\* in the above subjects will then be forwarded to him, which of course must be kept secret from the Candidates until the time of the Examinations.

These Examinations (where papers supplied by the

\* The uniform Examination Papers afford a common standard of examination; and, to promote uniformity in the application of that standard, special copies of the Examination Papers, with the number of marks to be awarded for a complete answer to each question, will be printed for the use of the local examiners. Thus, suppose that in a paper there are twelve questions, and that the aggregate number of marks assigned to the paper is 120; the number of marks placed opposite to each of the questions will depend upon their relative difficulty, and the proportion of these marks given by the examiner for the answer of any candidate will depend upon its accuracy and completeness. Supposing a perfect answer to a question to be set down as worth 20 marks, an examiner may award 20, 15, 12, or any less number, according to the merit of the answer. Thus the candidates all over the country, though their papers be tested by different examiners, will be placed as nearly as possible upon an equal footing. No candidate should receive a certificate who does not obtain at least 30 marks in *each* paper, the whole paper being worth 120 marks. It is desirable that the same person should examine *all* the candidates in any one subject at any centre.

Society of Arts are used) must, in 1869, be held on the 16th, 17th, and 18th March, after four o'clock, p.m., as follows :—

TUESDAY, 16th March, After 4 p.m.	WEDNESDAY, 17th March, After 4 p.m.	THURSDAY, 18th March, After 4 p.m.
Arithmetic.	English History. Geography.	Gospel History. English Grammar.

The District Unions and Local Boards will understand that, whether in the Elementary Examination the papers supplied by the Society of Arts, or entirely different papers are used, the Local Boards or their own Examiners must look through the Candidates' answers and award the certificates. When this has been done, a return in the following form must be made to the Secretary of the Society of Arts, who, in those cases where the Society's elementary papers have been used, will then forward the proper number of blank Forms of Certificate to be filled up by the Local Board :—

#### ELEMENTARY EXAMINATIONS, 1869.

Name of Board or }  
District Union. } \_\_\_\_\_  
No. of Centres \_\_\_\_\_

The foregoing Programme of Examinations is published in a separate form, and may be had *gratis* on application to the Secretary of the Society of Arts.

	HIGHER GRADE.		LOWER GRADE.	
	Examined.	Passed.	Examined.	Passed.
Males .....				
Females .....				
Totals .....				

It is particularly requested that this form may be filled up and returned to the Secretary of the Society of Arts in every case, as it is important that the full number of Candidates examined in the Elementary Examinations should be accurately known and stated.

Any Candidate who has obtained a certificate of the Higher or Lower Grade in these Preparatory Examinations in Elementary Subjects may, at the discretion of the Local Boards, if not less than sixteen years of age, be "passed" to the Final Examination of the Society of Arts in any of the special subjects in which his or her knowledge has also been properly tested.

The Council of the Society of Arts, while desiring thus to aid local bodies in promoting elementary education, hope they will prevent the possibility of the elementary certificates awarded by themselves being confounded with the certificates awarded by the Society of Arts.

### Proceedings of Institutions.

**YORKSHIRE UNION OF MECHANICS' INSTITUTES.**—At the last general meeting of the Central Committee of this Union, held in Leeds, Mr. E. Huth, of Huddersfield, in the chair, it was unanimously resolved to authorise the agent to organise public meetings in all parts of the county where he may deem it desirable for the purpose of directing attention to the subject of scientific instruction, and the means whereby the aid of the Department of Science and Art may be extended to the working classes. It was also resolved to invite the Standing Committee for Science and Art of the Yorkshire Board of Education to convene a conference of schoolmasters, to discuss the introduction of scientific teaching into schools. A register of duly qualified science teachers was directed to be opened at the office of the Union.

#### SCIENCE AND ART DEPARTMENT EXAMINATIONS.

The results of the recent examination of the works in drawing, painting, modelling, executed in the year 1867-68, in the schools of art, night classes, and schools for the labouring poor, are as follows:—As respects schools for the children of the labouring poor, 788 schools were examined, being an increase of 200 on the number examined in 1867. 87,300 exercises, worked by 58,000 children, were examined, being an increase in the year of 17,300 exercises, and 15,106 children. As respects schools of art and night classes, the number examined in 1868 was 204, being 38 more than in 1867. 8,500 students worked 16,700 exercises, an increase during the year of 1,700 students and 4,200 worked papers. 152 of these schools and classes sent up for examination 51,000 drawings, executed by 8,000 students in the ordinary course of the year's study, an increase of 24 schools, 19,000 works, and 1,500 students. In 1867, out of 44 candidates examined for the third grade, or art teacher's certificate, 15 were successful. In February, 1868, 62

candidates were examined, and 25 succeeded in passing the required examinations. Finally, the results show a total increase, in twelve months, of 240 schools examined, 18,306 candidates, and 40,500 works and exercises.

In 1867, the number of persons receiving instruction in drawing, from teachers holding drawing certificates granted by the Science and Art Department, was :—

In public and other schools .....	79,411
In provisional schools of art .....	14,639
In metropolitan district schools of art (including those in connection with the National Art Training School) .....	2,702
Students in training for masters and national scholars at South Kensington ..	44
Schoolmasters and pupil-teachers .....	1,651
In night classes for instruction in drawing ..	2,553
In private schools, grammar schools, &c. ....	4,529

Total ..... 105,529

### Fine Arts.

**AMSTERDAM FINE ART EXHIBITION.**—This important exhibition of the works of art of all nations, is announced to open on the seventh of September, and the works to be exhibited are to be sent in between the 10th and 24th of the present month of August. All communications to be made to the Commission of the Exhibition, at the Academy of the Beaux Arts, Amsterdam. There is one clause in the regulations which deserves notice; it is to the effect that no work can be received except from the producer, or accompanied by his consent in writing.

### Manufactures.

**NEW TANNING MATERIAL.**—The wood of the red Quebracho has been successfully applied to tanning purposes in Buenos Ayres. Messrs. Bletscher and Com-

pany, of that city, showed, at the Paris Exhibition, a collection of leathers tanned with the powder of this wood, and were awarded a silver medal for its employment. The trial of new tanning and dyeing substances in various countries cannot be too much recommended.

### Commerce.

**PARAGUAY TEA.**—Mate, or Yerba Maté, is made from the leaves of a species of holly (*Ilex paraguayensis*). These possess tonic and stimulant properties, so that they replace the true Chinese tea in South America. This plant, a native of Paraguay, constitutes large forests, termed yerbales, in the central and eastern and northern portions of the republic. The Jesuits planted great numbers of these trees round their residences, and these have continued to this day to furnish the principal article of commerce of the country. It is called by the natives "the plant," by the Spaniards "yerba," and by the Guarani, "caa." The annual production of Paraguay tea is estimated at  $4\frac{1}{2}$  to  $5\frac{1}{2}$  million pounds, of the value of £140,000 to £180,000.

### Colonies.

**NOVA SCOTIA.**—The *Mining Gazette* says:—"Nova Scotia has long felt the want of a good commercial agent in Europe, and we have much pleasure in being able to announce that Mr. Frederick Newton Gisborne has been appointed representative of the Mines Department at London."

### Obituary.

**M. BOUCHER DE CRÈVECEUR DE PERTHES**, a distinguished French palæontologist, died at Abbeville, in the 79th year of his age. M. de Perthes was not only an indefatigable *savant*, but a generous philanthropist; he had given liberal donations in aid of the young workwomen of eight or ten different districts of France, and he has left by will to seventeen towns a sum of four hundred pounds, the interest of which is to be given annually, by way of reward and encouragement, to the most deserving young workwoman of each town.

### Notes.

**THE MONT CENIS TUNNEL.**—During the month of July the progress made at the Mont Cenis Tunnel has been 123 mètres, of which 60 mètres was the length driven on the French side at Modane, and 63 mètres at Bardonnèche, on the Italian. The position of these works up to the 31st July was as follows:—

	Mètres.
Length driven at Modane .....	3,528
" " Bardonnèche ..	5,119
Total length of tunnel driven.....	8,647
Length remaining to be driven....	3,573

Total length of tunnel ..... 12,220

The boring is now going on more rapidly than before, as the character of the rock through which the tunnel is being driven is softer.

**AGRICULTURAL EXHIBITION AT SANTIAGO.**—It appears that the Chilean authorities, conceiving that the date appointed for the Santiago exhibition was too early, have deferred the opening to the 1st of April, 1869. A committee has been formed amongst the principal manufacturers of Paris and neighbourhood, with the view of facilitating the exhibition of French products at Santiago.

### Correspondence.

**THE PARCEL AND THE TELEGRAPH POST.**—SIR,—Of the administrative principles advanced in our report to the Society on the question of the parcel post were these:—That the public, having an establishment for the collection and distribution of letters of some twelve thousand postal stations, and of twenty-five thousand persons, had the right, and ought, for economy, to utilise that great establishment for the collection and distribution of any other matters within its capacity; that the main expense of the establishment being paid—rents, salaries, &c., it was within its capacity to render much additional service, at a lower rate of additional charge than it could possibly be rendered by any separate establishment to be paid for. These principles have been adopted by the Government, and sanctioned by the Legislature in the Postal Telegraphs Act. Now the mail post-carts may carry small parcels or printed matter, and the postman may carry and deliver them on his rounds with his letters, especially to outlying villages, and places where they could not be carried, except at disproportionate and, commonly, prohibitory expense, by separate carriers, whose whole time, for the one payment of service, must be paid for. I beg to call the attention of Chambers of Commerce, and of the Institutions in Union with the Society, and the Press, to the fact that the time has now arrived when the public may claim the application of these administrative principles to the conveyance of small parcels and printed matter as complementary to the telegraph post. The price at which the post now carries trade samples and patterns, of twopence for every quarter of a pound or fraction of a quarter of a pound, is a high protectionist exaction, and that, too, fenced by troublesome regulations. There is a demoralizing war of evasions for the transmission of comparatively few articles of value, as samples. Even the charge for books, which is one half that for samples, or a penny for each quarter of a pound or fraction of a quarter of a pound, is so high as only to be resorted to in very special cases, and—comparatively to the general book circulation in the provinces—very rare cases. In respect to the many, the wage classes, the present rates of charge impose on the transmission and interchange of small things, which are of high social value, the like obstructions to those which, under the old postal system, prevailed against trading and family correspondence. A son in place in London sends to his mother, by postage stamps or money order, a portion of his wages, and she in return might send him some piece of her own work, a pair of stockings, or some socks, or a comforter, and although it is no heavier than a book, she has not the privilege of sending it at the book rate, and if she were to pretend it was a sample, the sample rate, eightpence a pound, is extortionate and prohibitory. Now, on continental examples, that of Switzerland especially, as also that of Belgium, which served as examples for the telegraphic post, I submit that we may ask of the Government to rid us of the existing trammels to the use of the post, for the service in question;—to let us have a parcel post, at two pence a pound, and a half-penny for every quarter of a pound or fraction of a quarter of a pound, and to let us have halfpenny stamps for the purpose, since those rates will pay, as shown by continental postal examples, as shown also by private home examples of deliveries in districts at a halfpenny a pound and less. In Switzerland, say, there is to be a ball in Zurich, but a young lady finds that she has not got a proper pair of ball-shoes, and she telegraphs to her shoemaker at Geneva to send her a pair by return of post. A tradesman has a sudden demand for a small article, and he telegraphs for it to the wholesale house in Geneva or elsewhere to have it by return of post. By sending for them through the post, by letter sometimes, and by telegraph on frequent emergencies, much and increasing business is conducted with reduced amounts of stock. Of this I might give extended illus-



trations. Continental posts carry printed matter, newspapers, &c., at less than a halfpenny per sheet. In this country the cost of the distribution of penny newspapers by the newsvendors is, I believe, little more than a farthing, and for the newspapers the service may be left as it is in populous neighbourhoods; but a farthing will not pay, nor, commonly, a halfpenny either, for carrying a single paper a mile or so to any outlying place. But a halfpenny will pay well to the post which has its messengers going there. Then why should not the post be required to render the service of the delivery of printed papers for a halfpenny? Why should it be allowed to go on with a prohibitory exaction of a penny, the cost of the whole paper itself? To a scientific association like the Society of Arts, or the Association for the Promotion of Social Science, to charitable and other associations, with numerous members to whom circulars are required to be sent weekly, to electoral and commercial bodies—this exaction of the penny for every printed circular, so much beyond the real cost of the service, as shown by separate enterprises undertaking the service at less than half price, is an oppressive contravention of sound administrative and economical principles, from which we should now claim relief. There are a few grand people who yet pronounce the penny post to be a great plague, and who, sooner than that their lazy sybarite minds should have the very slightest disturbance, would stop the whole freedom of intercommunication of the many, and would, if they might, re-impose the fetters of the old prohibitory letter rates. The same species of people talk superciliously of the “plague of trade circulars.” But it is a primary economical object in a manufacturing and economical community to stimulate legitimate consumption. The smallest facilities in detail for the purpose are the greatest in their aggregate results. The complete utilisation of our postal machinery in these details, for collection and distribution, is a measure of first rate public magnitude. In his evidence before the committee of the House of Commons on the telegraph post, Mr. Scudamore stated that he had been “whipped up” to the measure by his chief. Now that there is some quiet; now that Mr. Ashurst, the diligent solicitor of the Post-office, will doubtless have the task of contending with the claims of the telegraph and the railway companies compensation, we may beg of the Postmaster-General to “whip up” Mr. Scudamore again, and bring him well “up to the collar” to drag forward this measure of the parcel post, which obviously belongs to him, as complementary to the great measure of the telegraph post.—I am, &c., EDWIN CHADWICK.

### Patents.

*From Commissioners of Patents' Journal, August 7.*

#### GRANTS OF PROVISIONAL PROTECTION.

Animal and vegetable substances, preserving—2329—G. A. Thibierge.  
Armour plates—2308—H. F. Hambleton.  
Banding cords, manufacturing—2315—T. Hart.  
Bellows, self-acting—2239—R. Berson.  
Boats, &c., constructing, &c.—2005—V. de Stains.  
Boilers, &c.—2253—C. J. Galloway and C. H. Holt.  
Boilers, &c., feeding—2292—A. M. Clark.  
Brewing—2274—E. Beanes.  
Bronzing printed work—2333—B. G. George.  
Buckets—2235—W. Turner.  
Buildings, &c., constructing—2095—J. H. Banks.  
Canal boats, &c., propelling—2268—W. R. Lake.  
Cask-washing apparatus—2337—J. Steel.  
Champagne, artificial—2278—L. Rose.  
Clocks, &c.—2317—W. S. Harrison.  
Cloth, &c., plaiting strips of—2111—G. Slater.  
Coal, &c., apparatus for getting—1223—G. E. Donisthorpe.  
Coal, &c., separating impurities from—2283—A. Homfray.  
Cocoa, preparing—2314—P. Pearson.  
Cotton, &c., winding warps of—2238—H. W. Ripley & T. Shackleton.  
Cotton wool, &c., teeth for machines for picking—2327—W. R. Lake.  
Counting machines—2276—C. P. Wilcox.  
Dove-tailing machines—2299—W. T. Hamilton.  
Drills for distributing corn, &c.—2233—J. Bonnal.  
Earthenware, &c.—2277—T. G. Green.  
Edibles and liquids, cooling and preserving—2256—J. Roberts.  
Engraving machines—2246—G. Moulton.  
Feathers, bleaching—2289—A. A. Wille.

Feeding bottles, caps for—2223—J. Thompson and J. G. Ingram.  
Fibrous substances, spinning, &c.—2270—H. B. Barlow.  
Fire-arms—2319—J. Purdey.  
Fire-arms, breech-loading—2305—C. E. Brooman.  
Fire-irons, &c.—2262—T. Kendrick and S. Davies.  
Fluids, raising and discharging—2258—R. Meldrum.  
Fuel, utilising—2325—F. H. Danchell.  
Furnaces—2040—E. B. Wilson.  
Furnaces—2265—J. Thomas.  
Gas—2261—D. Webster.  
Gas regulators—2229—W. Hollingworth and H. Halstead.  
Gas regulators—2322—J. S. Bromhead and J. Whitmee.  
Glass, manufacturing—2321—J. Kilner.  
Glass ornament applicable to lace, &c.—2259—E. A. Cowper.  
Glove fasteners—2287—T. Deschamps.  
Harness, &c., links for—2244—W. R. Lake.  
Hay, &c., cutting—2243—W. R. Lake.  
Horses, &c., clipping—2245—S. Davis.  
Hose, coupling—2295—C. W. Bradshaw.  
Iron, application of, for building purposes—2284—C. Weekes.  
Kilns for burning bricks, &c.—2263—C. G. Johnson.  
Lamps—1858—M. Rae.  
Lamps—2179—H. H. Doty.  
Lamps—2285—F. Green.  
Lawns, &c., trimming the edges of—1783—I. B. Guest.  
Letter boxes, &c.—2309—W. Dennis.  
Lightning conductors—2271—T. W. Gray.  
Liquid meters—2255—A. Browne.  
Loads, transporting—2281—C. Hodgson.  
Lockets—2313—W. Gilbert.  
Looms—2219—W. Shaw.  
Looms—2331—T. Wrigley and W. E. Yates.  
Manures, artificial—2297—S. Langdale.  
Metallic ores and compounds, treating—2293—T. Gibb.  
Mortising machines, chisel for—2231—R. Chamberlain.  
Motive-power apparatus—2254—W. and W. T. Eades.  
Motive-power engines—2264—J. Gill.  
Panoramic pictures—2280—J. Raine.  
Paper, manufacture of—2251—J. Duguid, jun.  
Pictures, &c., hanging—2205—A. Oldham.  
Pipe-joints—2267—F. Chomé-Steinbach.  
Piston valves—2221—C. J. Galloway and C. H. Holt.  
Ploughs—2311—A. Buchan.  
Pneumatic apparatus—1100—A. M. and M. A. Wier.  
Printers' type, &c.—2225—L. Hannart and N. A. Aubertin, jun.  
Printing machines—2164—J. Holt and G. S. Coponet.  
Racket bats—2304—T. A. Ward and H. Whale.  
Railway carriages, heating—2220—W. B. Farwell.  
Railway sleepers—2212—J. C. Leaver.  
Railways—2252—W. J. C. Muir.  
Railways, signalling on—2248—E. Funnell.  
Rotary steam engines—2320—C. E. Brooman.  
Rotary engines and pumps—2185—W. L. G. Wright.  
Safes and strong rooms—2228—C. de Bergue and J. C. Haddan.  
Sash fasteners—2267—S. Deacon.  
Screw propellers—2098—G. Alder.  
Sewing machines—2272—W. Winter.  
Ships, masting of—2241—D. Russell.  
Shuttles, &c.—2260—D. Sowden and R. C. Stephenson.  
Studs—2227—A. Taylor.  
Threads, drying and beating—2302—L. Dulac.  
Tubes or hose, flexible—2282—W. H. & A. M. Bates & H. Faulkner.  
Valves—2269—T. Bonell.  
Ventilators—2240—T. F. G. Wintour.  
Vessels of war—2249—C. P. Stone.  
Watch protectors, &c., for preventing robbery from the person—2250—A. Woollan.  
Wheat, &c., decorticating—2303—S. H. Hadley.  
Window blinds, &c., raising and lowering—2273—W. J. Cunningham.  
Windows and window fasteners—2237—R. Whiston.  
Wool, extract—2294—G. Martin.

#### INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Meat, preserving—2440—H. A. Bonneville.  
Skirts, bindings for—2434—G. T. Bousfield.

#### PATENTS SEALED.

106. W. W. Hooper.	496. H. A. Bonneville.
446. W. R. Lake.	497. H. A. Bonneville.
453. J. Tansley.	498. A. Lemasson.
456. T. Smith.	500. J. P. Lack.
458. J. W. Melling.	501. W. E. Gedge.
460. J. R. Stoney.	565. W. Weidon.
470. S. C. Lister.	655. J. R. Cooper.
478. S. B. Tucker.	663. J. Adams and H. Barrett.
479. W. Wootton.	845. F. Ryland.
485. R. George.	1261. F. Erskine.
487. W. E. Deverna.	1578. J. Dewar.

*From Commissioners of Patents' Journal, August 11.*

#### PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2042. A. F. Osler.	2062. H. Cartwright.
2105. J. F. Boetius.	2073. J. and H. Ingham and J. Broadley.
2190. A. V. Newton.	2074. C. O. Crosby.
2044. W. Pollock and J. Stobo.	2178. W. E. Newton.
2198. E. D. Hodgson.	

#### PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1994. H. Wilde.	1976. A. V. Newton.
1987. A. V. Newton.	1977. A. V. Newton.